Hazard Analysis Form

This form can be used by Fermilab Employees, Fermilab Supervisors, Fermilab Task Managers, Construction Coordinators, Service Coordinators and Fermilab Subcontractors. This is a dynamic document which may require modification as the project moves from start to finish and should be readily available at the site where the work is being performed.

Note: Not all sections of the first page are applicable to every job or task, complete what is necessary for your specific job or task.

Job Title Clean H- source back plate per TRIUMF User Manual V1.0

Job Location MDTL

Contract/Work Order # _____

TO BE COMPLETED FOR WORK INVOLVING SUBCONTRACTORS

Subcontractor (if applicable)	**Fermilab**
Company _____	Project Eng/C.M. Dan Bollinger
Project Manager _____	Phone 630.840 2325
Phone _____ Page _____	TM/CC/SC _____
ESH Rep. _____	Phone _____ Page _____
Phone _____ Page _____	ES&H Rep. _____
	Phone _____ Page _____

AT LEAST TWO SIGNATURES ARE REQUIRED

☑ Prepared Donna Hicks Date 09/22/15

Print Name Donna Hicks TD-CHO

☑ Accepted Richard Ruthe Date 9/24/2015

Print Name Richard Ruthe

☐ Accepted as noted _____ Date _____

Print Name _____

Description of Work:

Personal Protective Equipment: (Check protective equipment required for the job.)

X Safety glasses □ Side shields X Chemical splash goggles
□ Hearing Protection □ Hard Hats
□ 3.0 Brazing goggles □ Impact goggles
Face shield X Rubber apron
□ Leather gloves □ Hot/Cold thermal protective gloves
X Chemical resistant gloves (specify type): □ Respirators
Unsupported Neoprene and Nitrile
X Other required PPE (specify): □ Fall protection equipment (specify):
Tyvek lab coats; eyewash/shower close to work area; all work performed in explosion proof hood.
Cotton gloves for polishing process only.

Environmental Aspects (check one):

X Yes, I have thought about the environmental aspects of this job and will document such aspects and mitigation steps within this document.

□ Yes, I have thought about the environmental aspects of this job and no such credible aspects exist and therefore do not need to be written in this document.

Equipment required for the job: (List the tools needed to perform the job.)

Norton Burgundy Scotch Brite Pads
Sanding block, Kimwipes, Starrett Flat Stone or suitable flat plate for the entire back plate to lay on during cleaning. Q-tips, , Norton Black Ice Wet/Dry Sandpaper in Grades: 280. 400, 800, 1000, 1200, 1500, and 2000. Novus #3 & #2 Polishing compounds; Polishing cloth, cotton gloves. 3-Small squirt bottles to dispense alcohols and distilled water. Acetone, Methanol, and distilled water

Work Plan History Information: (List any lessons learned incidents from this job, tips from previous jobs)
The procedure to be followed comes from TRIUMF Type 15 mA H- Volume-Cusp Ion Source with Custom Vacuum Box: Chapter 8.0, Maintenance and Spare Parts.

Improvement/Feedback: At the conclusion of the job, the Task Manager, Supervisor and/or Project Leader shall work with those involved to consider lessons learned and receive feedback in order to improve future work plans.

Check One:

X Yes we have considered lessons learned and accepted feedback on this job and will communicate such information so that future work plans may be improved.
□ **Yes** we have considered lessons learned feedback and determined that future work plans do not need to be improved.

Utilizing the format below, identify hazards and environmental aspects, and their corresponding safety precautions/procedures to mitigate hazards. Use as many sheets as necessary.

HAZARD ANALYSIS

Step	Description	Hazards/ Environmental Aspects	Precautions / Safety Procedures
1	Review the SDS in Fermilab Database: Acetone #18820, Methanol #17625, Novus polish # 9541and #9540, and the NIOSH cards on Tantalum and copper before starting process.	Both solvents are highly flammable and poisonous to personnel. Tantalum is a flammable metal.	Carefully follow procedure; be alert to any symptoms of exposure. Wear listed PPE until process completed. Follow procedure closely as different gloves will be worn for specific steps. Perform all work in hood next to an emergency eyewash/shower- at MDTL Hood #1 should be used. Have absorbent media for solvents close to work area in case of any spill.
2	Place a secondary containment tray inside hood. Keep hood light and blower on until process complete. Set-up glove bag on tray and start purging oxygen out of bag using nitrogen gas. Maintain a constant low pressure of nitrogen until process in glove bag complete. Fill squirt bottle inside hood with acetone and then place into the glove bag. Add scotch brite pads and (Kimwipes) wipers to glove bag. Make sure you have enough wipers for this step of the process **in** glove bag.	Acetone has a low flash point and is extremely flammable in either liquid or vapor form. Acetone is harmful by inhalation, ingestion, or skin absorption. Tantalum is harmful via inhalation, ingestion or skin absorption; powder ignites SPONATANEOUSLY IN AIR.	Chemical resistant Glove bag will contain all hazards until all tantalum removed from back plate. Inert gas reduces combustion. Wear *Nitrile gloves* when handling back plate. Ensure you have enough scotch brite pads and wipers for this process. Wear *neoprene gloves* when handling acetone.
3	Put the flat plate and then the H- back plate inside the hood on the plate. Don *neoprene gloves*. Squirt a small amount of acetone onto plate. Allow acetone to dry. Then carefully insert plate into the glove bag	Acetone has a low flash point <20 C and is harmful by inhalation, ingestion, or skin absorption; Tantalum is harmful via inhalation, ingestion or skin	Use only enough acetone to wet plate. Minimize waste. Wear *neoprene gloves* while using acetone.

	and seal the equipment sleeve with tape.	absorption; powder ignites SPONATANEOUSLY IN AIR. Tantalum is a flammable metal.	
4 Red	Wearing the *Nitrile gloves*, insert hands into the polyethylene gloves of the glove bag. Using Scotch Brite pad, gently loosen and remove flakes of tantalum. Repeat at necessary.	Acetone has low flash point and is extremely flammable in either liquid or vapor form. Tantalum harmful via inhalation, ingestion or skin absorption; powder ignites **SPONATANEOUSLY IN AIR.**	Glove bag will contain the hazards of acetone and tantalum. Inert gas reduces combustibility. The *Nitrile gloves* are a secondary barrier while working in the glove bag.
5	Repeat step 4 until all gray/silver tantalum flakes removed. Use a small amount of acetone to wipe down the plate to remove any tantalum; Wipe copper back plate with wipers until dry. Contain **ALL** tantalum in wipers and put at back of glove bag where it will not be disturbed.	Acetone is highly flammable and poisonous to personnel. Tantalum is a flammable metal.	Glove bag will contain the hazards of acetone and tantalum. Inert gas reduces combustibility. Wear Nitrile gloves a secondary barrier while working in the glove bag.
6	Once all tantalum is removed (Gray/Silver flakes), carefully remove flat plate with the H-back plate, **without disturbing the wipers!** Set-aside on a clean tray inside hood. Stop the nitrogen gas purge. Slowly roll up the glove bag and seal all contaminated wipers and used scotch brite inside. Tape glove bag closed.	Acetone is highly flammable and poisonous to personnel. Tantalum is a flammable metal.	Label the glove bag as containing acetone and tantalum. Follow standard FESHM 8021 waste procedures.
7	With the flat plate and the ~~the~~ H- back plate in a secondary containment tray: Start with the 280 grit sandpaper and mounted on a sanding block. Start sanding using a circular	Acetone is highly flammable and poisonous to personnel. Copper particles are an irritant and can damage your lungs, liver, and	Use only enough acetone to wet plate. Wear *neoprene gloves* when using acetone. Minimize waste. Do not release any chemicals into the environment. Wipers and used sandpaper

	motion. Do not sand in one position or the flatness of the H- plate will be affected. The goal is to remove any remaining oxidation on the copper H-plate. Lift up the plate and blow any dust off of the plate toward the back of the fume hood. When finished with the 280 grit sandpaper, the plate should be carefully wiped off with acetone before changing to a different grit. Wear *neoprene gloves* when using acetone. One person should perform the sanding process while a second person (with clean nitrile gloves) can lift and blow off the plate. Change gloves every time you change the grit!	can cause kidney damage.	should be placed in red waste can labeled 'acetone'. Use exhaust of hood to remove any copper particles when dusting plate off. Prevent dispersion of particles in air where personnel can inhale them.
8	Continue sanding following the process in Step #7 using the: 400, 800, 1000, 1200, 1500 and 2000 grit. **Change gloves when changing to a finer grit size.** Avoid transferring coarser grit onto the plate when sanding with additional grit sizes by wiping down with acetone.	Acetone is highly flammable and poisonous to personnel. Copper particles are an irritant and can damage your lungs, liver, and can cause kidney damage.	Use only enough acetone to wet plate. Wear neoprene gloves while using acetone. Minimize waste. Do not release into the environment. Wipers should be placed in red waste can labeled 'acetone'. Use exhaust of hood to remove any copper particles when dusting plate off. Prevent dispersion of copper particles in air where personnel can inhale them.
9	Once plate sanding is complete, wipe surface with acetone. Wearing *nitrile gloves*, wrap clean cotton polishing cloth around the index finger and dab on a small amount of the Novus #3 Polishing Compound. Using a circular motion work across the back plate starting in the center of the plate; leave the outer edge unpolished. Rinse	Copper particles are an irritant and can damage your lungs, liver, and can cause kidney damage.	Minimize waste. Do not release any of the polishing compound into the environment.

	plate with distilled water and dry with wipers. Repeat as necessary.		
10	Wearing *Nitrile gloves*, wrap clean cotton polishing cloth around the index finger and dab on a small amount of the Novus #2 Polishing Compound. Using a circular motion work across the back plate; leave the outer edge unpolished. Rinse plate with distilled water and dry with wipers. Repeat as necessary. At end of polishing, wearing *neoprene gloves*, perform final rinse with methanol. Use Q-tips to wipe out the holes in the back plate	Copper particles are an irritant and can damage your lungs, liver, and can cause kidney damage. Methanol is toxic and a poison by inhalation, skin contact, or ingestion.	Minimize waste. Do not release any of the polishing compound into the environment. Wipers and Q-tips with methanol dispose of in red waste can. Wear *Nitrile gloves* while using polishing compounds. Wear *neoprene gloves* to prevent skin contact when rinsing with methanol.

GUIDELINES FOR COMPLETING THE HAZARD ANALYSIS

Phase of Work	Safety Hazard	Precautions/Safety Procedures
Examining a specific job by breaking it down into a series of steps or tasks, will enable you to discover potential hazards employees may encounter. Each job or operation will consist of a set of steps or tasks. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. To determine where a step begins or ends, look for a change of activity, change in direction or movement. Picking up the box from the conveyor and placing it on a hand truck is one step. The next step might be to push the loaded hand truck to the storage area (a change in activity. Moving the boxes from the truck and placing them on the shelf is another step.	A hazard is a potential danger to a person or equipment. The purpose of the Job Safety Analysis is to identify ALL hazards- both those produced by the environment and those connected with the job procedure. To identify hazards, ask yourself these questions about each step: Is there a danger of the employee striking against, being struck by, or otherwise making injurious contact with an object? Can the employee be caught in, by, or between objects? Is there potential for slipping, tripping, or falling? Could the employee suffer strains from pushing, pulling, lifting,	Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the hazards that could lead to an accident, injury, or occupational illness. Begin by trying to: 1) engineer the hazard out; 2) provide guards, safety devices, etc.; 3) provide personal protective equipment; 4) provide job instruction training; 5) maintain good housekeeping; 6) insure good ergonomics (positioning the person in relation to the machine or other elements in such a way as to improve safety). List the recommended safe operating procedures. Begin with an action word. Say exactly what needs to be done to correct the hazard, such as, "lift using your leg muscles." Avoid general statements such as, "be careful", "use caution", and "be alert". List the required or recommended personal protective equipment necessary to perform

The final step might be returning the hand truck to the receiving area. Be sure to list *all* steps needed to perform the job. Some steps may not be performed each time; an example could be checking the casters on the hand truck. However, if that step is generally part of the job it should be listed.	bending, or twisting? Is the environment hazardous to safety and/or health (toxic gas, vapor, mist, fumes, dust, heat, or radiation)? Are there electrocution hazards? Close observation and knowledge of the job is important. Examine each step carefully to find and identify hazards- the actions, conditions, and possibilities that could lead to an accident. Compiling an accurate and complete list of potential hazards will allow you to develop the recommended safe job procedures needed to prevent accidents.	each step of the job. Give a recommended action or procedure for each hazard. Serious hazards should be corrected immediately. The JSA should then be changed to reflect the new conditions. Finally, review your input on all three columns for accuracy and completeness. Determine if the recommended actions or procedures have been put in place. Re-evaluate the job safety analysis as necessary.

I have reviewed this hazard analysis and I understand the hazards and required precautionary actions. I will follow the requirements of this hazard analysis or notify my supervisor or Fermilab contact if I am unable to do so.

Name and ID (please print)		Signature	Date
ALEJANDRO SOSA	30903N	Alejandro Sosa	9-24-2015
ANDREW FELD	13447N	A Feld	9-24-15
KEN Koch	6125	Ken Koch	9-24-15
Bruce Hanna	3242	Bruce Hanna	9-24-15
Dan Billinger	8342	D. J. S. h.	9/24/15
LIONEL PROST	14086	[illegible]	9/24/15